Chapter 4

MONITORING, EVALUATION, AND RESEARCH

This chapter describes how monitoring and evaluation requirements will be met. Monitoring and evaluation ensure that Forest Plan direction is being carried out and assess the quality of Forest Plan implementation (Table 4.1). In the process of evaluating the Plan, we also become aware of some modifications and changes needed. Monitoring results may be the catalyst for plan revisions or amendments.

The chapter also briefly discusses future research needs on the Forest.

Monitoring

Monitoring is carried out to observe or record the results of management actions. This consists of collecting information from selected sources, usually on a sample basis. There are three levels of monitoring:

- Monitoring Implementation - Was it done right?
  This determines if prescriptions, projects, and activities are implemented as designed and in compliance with Forest Plan goals and guidance.
- Monitoring Effectiveness - Did it work?
  This determines if prescriptions, projects, and activities are effective in meeting management goals and direction.
- Validation Monitoring - Is the guidance appropriate?
  This determines if the initial data and assumptions used in developing the Plan were correct or if there is a better way to meet forest planning regulations, policies, and goals.

A monitoring and evaluation matrix (Table 4.2) contains the items to monitor and evaluate as the Forest Plan is implemented.

The monitoring requirements are designed to meet the legal requirements in 36 CFR 219 (1982). As the Forest Plan is implemented, more specific monitoring direction will be included in the program of work and project plans. This program will be responsive, dynamic, and updated as projects are proposed and added to the program of work for a particular fiscal year.

The monitoring program will be conducted to include a consideration of the effects of national forest management on land, resources, and communities adjacent to or near the Forest, and the effect upon national forest management from activities on nearby lands managed by other government agencies or under the jurisdiction of local governments. The program will be re-evaluated at least every five years (36 CFR 219.7 (f)). Monitoring and evaluation requirements will provide a basis for a periodic determination of the effects of management practices (36 CFR 219.11 (d)).

Evaluation

An evaluation and summary of monitoring results will be written and published in an evaluation report. The report includes:

- A concise display of the results of monitoring and a statement of recommended actions, including changes in management direction, revisions, or amendments to the Forest Plan.
- A summary of available information on management indicator species (MIS) or comparable species.
- A summary of other agency monitoring activities which have a bearing on Forest management.
- A summary of accomplishments and expectations for future activities.
- An update of research needs and accomplishments.
- A summary of large scale or significant projects or programs such as storm recovery.

The report will be made available to the public. Public participation is encouraged in monitoring programs, including involvement of volunteers and partners in the actual monitoring procedures.

Five years after the Forest Plan is approved, the Forest Supervisor will review the land conditions to determine whether conditions or demands of the public have changed significantly (36 CFR 219.10 (g)). Significant changes may trigger a plan amendment or revision.

In 10-15 years, during the revision of the Forest Plan, an overall review of the annual evaluation reports will be used as one measure to analyze the management situation and identify possible needs for change in management direction. This analysis will be submitted to the Regional Forester for review prior to Plan revision.

Management reviews are also an important part of the monitoring and evaluation process. Interdisciplinary teams as well as the Forest Supervisor and Regional Forester perform management reviews periodically. These reviews may focus on information which surfaces through the monitoring and evaluation process.

Table 4.1

MONITORING FRAMEWORK

Forest Plan Monitoring (Chapter 4)	**Monitoring and Evaluation Program (2-3 Year Schedule)**	**Monitoring and Evaluation Report**
Broad and Strategic. Provides the monitoring requirements and focuses on what is needed to monitor the Forest Plan. It provides the overall monitoring strategy including specific questions that need to be answered, what will be monitored, timetables for reporting, and other information.	Focused and Technical. Describes how, where, and when to accomplish the monitoring prescribed in the Forest Plan. It provides the specific methods, protocols, and analytical procedures. This program is flexible and is modified by the Forest leadership team in response to new information, emerging issues, species concerns, and budgetary considerations. Identifies precisely what will be monitored and by whom for the upcoming 2-3 years.	Specific, Technical, and Prescriptive. The Forest interdisciplinary team reviews the current year's projects and collects and documents the monitoring and evaluation results. These findings are documented in a report along with recommended changes to project design or implementation, the Monitoring and Evaluation Program, the Forest Plan, or Forest Service Manual or Handbook.

Monitoring and Evaluation Program

Specific monitoring items, measuring frequencies, methodologies, precision, and reliability are identified in the annual Monitoring and Evaluation Plan.

Table 4.2

MONITORING AND EVALUATION MATRIX

Monitoring Requirement or Question	**Method**	**Resource to be Measured**	**Frequency**	**Reliability**
PROGRAM ACCOMPLISHMENTS				
Have objectives been met by a quantitative comparison of outputs and services with those projected by the *Forest Plan?*	Review annual accomplishment report	Various	Annual	High
Determine research opportunities, identify State and Private Forestry (S&PF) support and coordinate needs.	Various	Various	Annual	Good
CONSERVATION OF THREATENED AND ENDANGERED SPECIES HABITAT				
Monitor effects of management on critical habitat for threatened and endangered species and ensure compliance with recovery plan objectives.	Various	T&E Species	As determined by recovery plans	High
Monitor the extent Forest management is contributing to the conservation of threatened and endangered species and moving toward short term (10-20 years) and long term (100 years) objectives for their habitat conditions and population trends.	Various	T&E Species	As determined by recovery plans	High
In cooperation with the USDI Fish and Wildlife Service, track the status of Indiana bats on the Forest by monitoring: • Occupied hibernacula to assess changes in population numbers, changes in microclimate, and the effectiveness of protective	Various	Indiana bat populations and habitat	Annual	Moderate

Monitoring Requirement or Question	Method	Resource to be Measured	Frequency	Reliability
structures currently in place • Habitat use at all sites where Indiana bats are documented on the Forest will be quantified at both the local and landscape level using GIS or comparative software. • Annual incidental take	Various	Indiana bat populations and habitat	Annual	Moderate
Determine the number of suitable roost trees available on the Forest.	Forest Inventory Assessment data	Roost trees	1-5 years	Low
MAINTAIN AND RESTORE SUSTAINABLE ECOSYSTEMS				
Is this Forest complying with guidance outlined in *Forest Plan*?	On the ground review	Soil and water resources, and regeneration areas	Annual	High
Has the land suitability classification changed since identified in the *Forest Plan?*	Review acres identified as suitable	Suitable and unsuitable acres	Every 10 years	Moderate
Are insect and disease population levels compatible with objectives for restoring or maintaining healthy forest conditions?	Survey for insects and disease damage	Affected trees	Ongoing with USDA-FS S&PF and Indiana Department of Natural Resources (IDNR)	High
To what extent is Forest management controlling undesirable occurrences of fire, insect, and disease outbreaks?	See above, plus monitor fire reports	Occurrences	Annual	High
What level of prescribed fire should be used to maintain desired fuel levels or mimic natural processes, maintain and improve vegetative conditions, or restore natural processes and functions to ecosystems?	Monitor areas prescribed burned and areas where a fire regime is thought to be appropriate	Affected acres	1-5 years	Moderate

Monitoring Requirement or Question	Method	Resource to be Measured	Frequency	Reliability
To what extent is Forest management contributing or responding to air quality effects on ecosystems, human health, or human enjoyment?	As identified in regulations	Air in vicinity of prescribed burns	Annual *	Moderate
Are harvested lands adequately restocked within 5 years?	Stocking surveys on regenerated acres	Reforested acres	3rd year after activity	High
Are the effects of Forest management resulting in significant changes to productivity of the land?	Varied	Acres affected by management	Annual	Moderate
Have there been changes in cave environments?	Various	Caves	Various *	Moderate
Is the right mix of even-aged and uneven-aged management being used and in the correct forest types to meet objectives?	Monitor size limits of harvest areas	Timber sales	Annual and compare to restocking surveys	Monitor
Does location and shape of even-aged harvests blend with the natural terrain?	Use ELTP boundaries for layout	Regenerated areas	Annual *	High
To what extent are management, natural disturbances, and subsequent recovery processes changing the vegetation composition, special patterns, and structure? Are conditions moving toward short-term and long-term objectives?	Vegetative inventory	Various	Every 5 years	Moderate
Are appropriate harvest methods, management intensity, and utilization standards being used?	On harvest areas, sale administrators will monitor utilization. Stocking surveys will determine if harvest methods was successful.		As EA's and Activity Reviews are done *	High
What are the population trends of management indicator species?	Done in cooperation with IDNR	MIS populations by their relationship to habitat changes	5 years	Moderate

Monitoring Requirement or Question	Method	Resource to be Measured	Frequency	Reliability
Are even-aged management practices benefiting wildlife species?	Done in cooperation with IDNR	Ruffed grouse populations by their relationship to habitat changes	5 years	High
What is the status of oak and hickory on established regeneration plots dating to 1985 Purdue study?	Monitor species data	Plot data on tree species from 1980's clearcuts	Every 15 years	High
To what extent is Forest management contributing or responding to populations of terrestrial or aquatic non-native invasive species that threaten native ecosystems?	Monitor trends in known populations of invasive species	Invasive populations	Monitor some populations	Moderate
How will diversity be affected by various mixes of resource outputs and uses? Ensure that the diversity of plant and animal communities is at least as great as that which would be expected in a natural forest and that reductions in diversity are prescribed only where needed to meet overall multiple use objectives.	Inventory population data on plant and animal communities on established plots or transects	Species observed	5 years	Moderate
MAINTAIN AND RESTORE WATERSHED HEALTH				
To what extent is Forest management affecting water quality, quantity, flow timing, and the physical features of aquatic, riparian, or wetland ecosystems?	Sampling of water features on Forest	Streams, riparian and wetland areas	Various *	Moderate
Have the soil and water mitigation and protection measures been effective as applied to all management activities?	Measure soil compaction and movement	Soil and water mitigation and protection measures	Various Activities Annual *	Moderate

Monitoring Requirement or Question	Method	Resource to be Measured	Frequency	Reliability
PROTECT OUR HERITAGE RESOURCES				
Are mitigation and protection measures correctly applied for ground disturbing activities?	Monitor project design and visual inspection of project areas	Number of heritage sites or projects	Annual	High
Are heritage resources being damaged by vandalism?	Visual inspection of site area	Number of heritage sites	Annual	High
PROVIDE FOR A VISUALLY PLEASING LANDSCAPE				
Is the Forest evaluating the visual resource?	Monitor project design and implementation	Forest-wide landscapes	Annual *	High
PROVIDE FOR RECREATION IN HARMONY WITH NATURAL COMMUNITIES				
Are we limiting and distributing visitor use in wilderness in accord with periodic estimates of the maximum levels of use that allow natural processes to operate freely and so as not to impair the values?	Monitor wilderness resources according to Wilderness Implementation Schedule	Entire wilderness	5 years	High
Consideration of establishment of physical facilities, use regulations, and recreation opportunities responsive to current and anticipated user demands.	Monitor public feedback to trailhead, campground, sign, and restroom designs and functions, including accessibility.	Forest-wide	Annual	High
Is trail use planned and implemented to protect land and other resources, promote public safety, and minimize conflicts, with other users of the NFS lands?	Monitor selected trails. Evaluate the type and amount of use.	Forest-wide	Annual	High

Monitoring Requirement or Question	Method	Resource to be Measured	Frequency	Reliability
PROVIDE A USEABLE LANDBASE				
Does the Forest's land adjustment program support and enhance the Plan's desired conditions and goals and contribute to efficient and effective stewardship?	Monitor public feedback on land adjustment activities	Comments and issues identified	Ongoing	Moderate
Are temporary roads closed and revegetated within 10 years of contract or permit termination?	Inspect temporary roads after closure or permit termination	Miles of temporary road	5 years	High
To what extent is the Forest, in coordination with other public agencies, providing safe, cost effective, minimum necessary road systems for administrative and public use?	Meetings with public agencies and following FSH and FSM guidelines	Miles and standards of roads	*	High
PROVIDE FOR HUMAN AND COMMUNITY DEVELOPMENT				
Are there emerging issues, concerns, and opportunities?	Monitor public comments and contacts in community	--	Ongoing	Moderate
Have output levels and mixes of goods and services demanded by society changed significantly when compared with those levels projected by the Forest Plan?	Demand analysis	Various resources	5 years	Moderate
How do actual costs of carrying out planned management compare to cost estimates?	Budget analysis	Unit costs	Annual	High
Are timber sales meeting Forest Plan ASQ?	Annual sale report	Ccf sold	Annual	High

* As determined by Environmental Assessments, Activity Reviews, or Program Reviews.

Steps in monitoring and evaluation and procedures to update the Forest Plan

Monitoring

- Forest staff assistance trips
- Management reviews
- Routine observations
- Site-specific observations by specialists
- Accomplishment reports
- Discussion with other agencies and public users

Evaluation

- Annual evaluation of monitoring results by interdisciplinary team and Forest staff
- Forest staff review evaluation on an annual basis
- General management review based on identified problems, generally on a 5-year basis
- Regional management reviews as needed
- Overall evaluation of annual reports by Forest Supervisor

Recommendations

- Monitoring and Evaluation Team conducts annual review and evaluation with recommendation to Forest Supervisor
- Regional management reviews recommendation to Regional Forester
- Forest Supervisor makes recommendation for Plan revision or as needed for a significant amendment

Decision

- Forest Supervisor's decision on nonsignificant amendments to Plan, documented in evaluation report
- Forest Supervisor's decisions on a need to recommend significant amendment or revision
- Regional Forester’s decision on the need for significant amendment or revision

Research Needs

Research and monitoring are related activities that allow for adaptive management of national forests. Research activities include planning, design, quality control, and peer review of studies, and relatively rigid publication standards. Monitoring, in contrast with research, is generally conducted under less controlled conditions and results are often more general. Research needs for management of the National Forests are identified during the planning process and reviewed periodically during monitoring and evaluation of the implemented Forest Plan.

Research is often done on an ad hoc basis as opportunities arise with other agencies or universities. Some needs, included here, have been identified during forest planning; other needs which surface as a result of monitoring will be reported in the annual Monitoring and Evaluation Reports.

Conservation Of Threatened And Endangered Species Habitat

Research is needed to determine the distribution, abundance, genetics, ecology, and needs of endangered and threatened species.

Maintain And Restore Sustainable Ecosystems

Native plant communities need to be better defined in terms of floral composition, distribution, genetics, abundance, site relationships (soil, slope, and aspect), indicator plants, and ecological requirements. The ecological classification system needs further development and analysis to increase understanding of natural communities, particularly site relationships affecting population distribution and abundance.

Research is needed to determine the current and historic distribution and relative abundance of animal species and communities and their ecological relationships with plant communities.

Research is needed to determine the effects of management for early successional forest habitat on biological diversity. Better understanding of the needs of young forest plant and animal species and communities, including Neotropical migrant birds, is a specific research need.

Effects need to be determined on biological diversity of management for extensive, closed-canopied forest; of forested corridors which link forest areas across the landscape; of old growth forests; and of restoration of natural plant communities. Better understanding of the needs of forest interior plant and animal species and communities, including Neotropical migrant birds, is a specific research need.

Research could focus on defining conditions that cause oak to regenerate well within those ecosystems (ECS units) where oak is a natural member of that plant community or successional or seral stage. Research needs to identify methods to ensure desired amounts of oak regeneration and the role of natural species selection in determining the final stand composition.

Better information needs to be developed on what plant species can coexist in a stable community and what appropriate control objectives and activities should be undertaken when these communities become out of balance or are invaded by exotic species. Research is needed to determine what native plants are best suited to what activities and how they can best be established.

More information on vegetation response to prescribed fire is needed to help managers make better decisions for timing and uses of prescribed fire in central hardwoods management. Determine the effects of prescribed fire and various silvicutural treatments on animal and plant species in the area, including beneficial effects to native plants and potential adverse effects to nonnative plants, animals, and karst systems.

Maintain And Restore Watershed Health

Research is needed on the effect of different types of stream crossing structures on aquatic species and stream channel hydrology.

Research is needed on presettlement stream geomorphology and hydrological function.

Protect Our Heritage Resources

Conduct non-project driven surveys to locate heritage resources on the Forest. Work toward completing surveys for all NFS lands.

Continue research of rock shelters including those at the end of their developmental cycle, i.e. those that are collapsed or have completely filled in. Because these may contain the oldest deposits, research will contribute to our understanding of the earliest humans.

Develop heritage contexts as an aid in evaluating the significance of heritage resources. Focus research on each context and identify prominent examples for intensive excavation. Interpret a range of these sites.

Emphasize oral history interviews of local elderly people to record unwritten history.

Research and compile a Forest history to document our contribution to the region and celebrate our organizational past.

Provide For A Visually Pleasing Landscape

Research is needed on the role of the visual management system and its effectiveness in national forest management.

Provide For Recreation In Harmony With Natural Communities

The Forest, working in partnership with interested groups, has the opportunity to develop many options for recreational users. More specific information is needed on current use and demand for recreation facilities now present on the Forest, along with an analysis of developing trends, and emphasis on areas needing future development.

The Forest also needs information on how to best market or de-market recreational opportunities available on the Forest to provide services to a higher percentage of the public.

Provide A Useable Landbase

No research needs identified at this time.

Provide For Human And Community Development

Effects of predicted long-term climate change on biological diversity in the Forest need to be monitored.

Management techniques need to be refined for acceptable hardwood regeneration, harvest schedules, and yield predictions for both even- and uneven-aged management.

This page left blank